REMARKS

As recited in Claim 1, the present invention is a diamond layer of single crystal CVD diamond which is colored and which has a thickness greater than 1 mm.

As claimed in Claim 31, Applicants have also invented a method for producing such a diamond layer, which includes the steps of providing a diamond substrate having a surface which is substantially free of crystal defects, providing a source of gas, dissociating the source gas to produce a synthesis atmosphere which contains 0.5 to 500 ppm nitrogen, calculated as molecular nitrogen, and allowing homoepitaxial diamond growth on the surface which is substantially free of crystal defects.

As discussed in further detail below, the applied prior art neither discloses nor suggests the presently-claimed diamond layer, or the above-discussed method for producing it.

The rejection of Claims 1-30 and 37-40 under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over, U.S. 5,328,548 (Tsuji et al), is respectfully traversed. Tsuji et al discloses a method of synthesizing single diamond crystals of high thermal conductivity which involves graphitizing amorphous carbon containing at least 99.9 atomic percent of carbon with mass number 12 at a minimum of 1800°C in an inert atmosphere and submitting the thus-obtained highly crystalline carbon to a high pressure and temperature process (HPHT) to process synthetic single diamond crystals, which diamond crystals are described as having a thermal conductivity at least 1.5 times higher than those of conventional synthetic single diamond crystals and are made up of substantially nitrogen-free, natural type IIa diamond (column 2, lines 47-61). As the inert gas, Tsuji et al discloses argon gas as the most preferable inert gas, although nitrogen gas may be used instead (column 4, lines 23-25). Tsuji et al discloses further that single diamond crystals obtained by the conventional methods of synthesis usually contain 10-100 ppm of nitrogen as an impurity,

but that a further improvement in thermal conductivity can be achieved if the nitrogen impurity is completely eliminated (column 4, lines 59-67). In Example 1 therein, Tsuji et al discloses the formation of a yellow single crystal that was free from metal inclusions and irregular shape crystals and that contained approximately 60 ppm of nitrogen, which single diamond crystal was cut to a rectangular parallelopiped of 2 × 2 × 3 mm (column 5, lines 46-51).

The most significant difference between the presently-claimed invention and Tsuji et al is that the presently-claimed invention is drawn to single crystal **CVD** diamond, while Tsuji et al is drawn to **HPHT** diamond. That the products formed from such processes would necessarily be different from each other would be clearly recognized by persons of ordinary skill in this art. Thus, the presently-claimed invention distinguishes Tsuji et al on this basis alone. In addition, Tsuji et al's description of a yellow single crystal is accompanied with a relatively significant amount of nitrogen, i.e., 60 ppm, as discussed above with regard to Example 1 of Tsuji et al. Nitrogen incorporation in HPHT diamond is well known, generally taking the form of single substitutional nitrogen (ssN), which gives rise to a yellow color, becoming more brown as the concentration increases. The description of 60 ppm nitrogen is consistent with a yellow color in HPHT diamond. In the present invention, on the other hand, while nitrogen incorporation in CVD diamond does occur, it is structurally different from how it is incorporated into HPHT diamond. Particularly, typical levels of nitrogen in CVD diamond are much lower than 60 ppm, and often substantially lower than 1 ppm. In CVD diamond, color is not achieved by the presence of nitrogen in the lattice after synthesis, but by the interaction of the nitrogen with the growth process, which creates defects other than ssN, and in many cases, defects which do not contain nitrogen at all. The formation of these defects is very specific to the general method of CVD growth, such as the presently-claimed method herein. Moreover, the yellow color of ssN in HPHT diamond generally gives rise to

a hue angle much greater than 90°, such as about 110-120°, and is thus quite distinct from colors obtainable with the present invention, where the hue angles are generally less than 80°. The differences in hue angle provide further evidence of a distinction between CVD diamond of the present invention and the HPHT diamond of Tsuji et al. Thus, the properties of the defects formed in CVD diamond by using controlled nitrogen addition, as in the present invention, are substantially different from the defects in HPHT diamond, thus enabling the unique control of color in CVD diamond, one of the benefits of the present invention. By being able to control the CVD growth process, thereby controlling specific defects, Applicants are able to provide uniquely novel colors in a CVD diamond, which controlled production of colors has never been achieved previously in CVD diamond. Indeed, the HPHT process of Tsuji et al cannot provide such colored diamond of the present invention.

Applicants note that the Examiner states that Claims 37 and 38 should not depend on a nonelected claim. However, since the present claims are patentable, non-elected Claim 31, from which Claims 37 and 38 depend, is rejoinable, and should be allowable as well.

For all the above reasons, it is respectfully requested that the rejection over Tsuji et al be withdrawn.

The rejection of Claims 1-30 and 37-40 under 35 U.S.C. § 102(a) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over, Yan et al, "Very high growth rate chemical vapor deposition of single-crystal diamond," in Proceedings of the Nat'l Academy of Sciences, Vol. 99, No. 20, pp. 12523-12525 (October 1, 2002) (Yan et al), is respectfully traversed. While Yan et al is drawn to CVD single crystal diamond, Yan et al does not disclose successfully making or how to make a diamond layer of single crystal CVD diamond of thickness greater than 1 mm, as required by the present claims. Applicants note that the Examiner refers to page 12524 of Yan et al, but does not identify any particular description therein. At this page, Yan et al discloses an unpolished CVD diamond having

dimensions 4.2 × 4.2 × 2.3 mm^3, which would at first blush appear to indicate a thickness of 2.3 mm; however, the earlier description at the bottom of the right column of page 12523 of a substrate seed having dimensions 3.3 × 3.5 × 1.6-mm^3, coupled with a further description of "a 0.7 mm deposit on the seed", indicates a thickness in this example of only 0.7 mm, which is less than the presently-recited minimum. While Yan et al at page 12524 subsequently describes a 5-carat single crystal of larger dimensions, it is described as brown in color and having a crack on the {111} face. Thus, this disclosure is no better than that of a failed experiment; no single crystal CVD diamond of at least 1 mm in thickness is described. Nor does Yan et al disclose or suggest the presently-claimed method, as discussed above, for forming such single crystal CVD diamond.

For all the above reasons, it is respectfully requested that the rejection over Yan et al be withdrawn.

The provisional rejection of Claims 1-30 and 37-40 under the judicially created doctrine of obviousness-type double patenting over Claims 52-61 of co-pending application no. 10/655,040 (co-pending application), is respectfully traversed. The Examiner is respectfully requested to hold this provisional rejection in abeyance until the present claims are found to be allowable but for this rejection. If, at that time, the co-pending application has not been allowed, then the present application should be allowed, and a non-provisional double patenting rejection made in the other application, if applicable. See M.P.E.P. 822.01. (Applicants do not concede that any such rejection would be applicable.)

For all the above reasons, it is respectfully requested that the provisional rejection be held in abeyance, if not withdrawn.

The rejection of Claims 2-7 under 35 U.S.C. § 112, second paragraph, is respectfully traversed. With regard to the term "fancy", Applicants note that the present claims (as are all claims) are directed to persons of ordinary skill in the relevant art. The term "fancy color" is

a well-established term in the diamond art and would be well understood. A fancy diamond is a diamond of attractive color (other than white) suitable for gem use. In general, the color needs to be sufficiently intense for it to be visible in a face up configuration of a cut gemstone, and to be more intense than Z on the GIA gem color grading scale (which runs from D being pure white, through the alphabet until Z, which is significantly colored), although for extremely rare but attractive colors (notably blue or pink) light fancy colors are defined which are not beyond Z in saturation although are still distinctly colored. Typically, the description "fancy" is followed by a modifier indicating saturation (depth of color) and a further modifier indicating hue, for example "fancy intense green". The above descriptions are supported by publicly available sources and publications, including GAGTL (The Gemmological Association and Gem Testing Laboratory of Great Britain), including their Gem Diamond Course Notes, 2005, and their Diamond Grading Manual 2001, and the book: Eric Bruton, "Diamond" (2nd Edition) 1978, Chiltion Book Co., Radnor, PA.

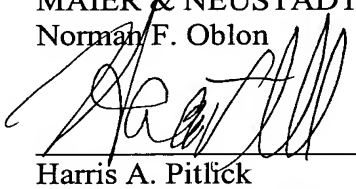
With regard to the term "hue angle", Applicants note that this term is described in the specification at pages 16-17.

For all the above reasons, it is respectfully requested that this rejection be withdrawn.

Applicants respectfully submit that all of the presently-pending active claims in this application are in immediate condition for allowance. The Examiner is respectfully requested to rejoin nonelected claims of even scope, and in the absence of further grounds of rejection, pass this application to issue with all pending claims.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon



Harris A. Pitlick
Registration No. 38,779

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)

NFO:HAP\la